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A case for dynamic asset allocation for long term investors

Gabriel Petre

World Bank, 1818 H Street NW, Washington, DC, 20433, USA

Abstract

The strategic asset allocation (SAA) decision represents the key driver of results for long term institutional investors. In practice this decision translates into a static portfolio with fixed allocations to narrowly defined asset classes which is not responsive to time varying expected return and risk driven by changes in the economic environment for example. In this context we define dynamic asset allocation (DAA) as the process of implementing time varying expected excess returns (returns over the risk free rate) and/or expected risk with a medium term time horizon. In this paper we assess its applicability for long term institutional investors, review different forms of implementation seen in practice, and discuss key requirements and governance challenges in an institutional context.

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Keywords: strategic asset allocation; dynamic asset allocation; expected excess return; investment horizon; liabilities; funded status; funded ratio; mean reversion.

1. Introduction

The strategic asset allocation (SAA) decision represents the key driver of results for long term institutional investors like sovereign wealth funds and pension funds. The mainstream theoretical approach used to set the SAA relies on the modern portfolio theory and the mean-variance optimization framework. For these longer term investors, the asset allocation review process is typically done infrequently (e.g. every 3-5 years) and it involves a comprehensive analysis of the long term risk tolerance and preferences of the asset owners, cash flow profile of the fund, and, liquidity needs and liability profile. In the case of pension funds and sovereign wealth funds this is usually done through an asset-liability management (ALM) study. Asset properties are modelled on a forward-looking basis using long term expected return and risk assumptions which reflect unconditional expectations, in other words, some sort of equilibrium view of financial markets and resulting risk premiums. The output of the process is a static asset allocation expected to maximize the investment objective (for example either as a real return target for sovereign wealth funds and/or as a surplus return target in the case of pension funds) over the long investment horizon (e.g. 10-15 years) given risk constraints. In addition, active risk versus the static SAA is allocated to portfolio managers focused on generating excess returns over short investment horizons (typically up to 1 year). Embedded in this approach, and what is reflected in the SAA, is the view that markets are efficient and thus have close to constant properties with respect to expected risk and return, and that these properties are best captured by a strategic long term allocation to asset classes. In this view of the world, changes in the investment opportunity set are unpredictable and best captured by skilled active management.

From an empirical point of view increased evidence over time of asset bubbles and market crashes, return distributions that exhibit

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fatter tails and asset return volatilities and correlations which are not constant over time supports the concepts of ‘fair value’ and mean reversion around fair value in asset prices. This, in turn, implies that expected excess returns (returns in excess of the risk free rate) may vary over time. Theoretical and empirical evidence of time varying expected excess returns and relative risk aversion challenged the optimality of the static approach to asset allocation - see for example Merton (1971), Fama and French (1988), Campbell and Shiller (1988) and more recently Campbell and Cochrane (1999, 2002). Their work and the work of others suggested that even in an informational efficient market with rational investors, expected returns can change over time due to changes in preferences to volatility in consumption and wealth. Furthermore, this body of literature suggests that these changes in expected excess returns and risk are at least somewhat predictable over the medium term by using observable state variables linked to the economic or business cycle. Vliet and Blitz (2009) find that the risk of a static SAA allocation tends to increase during recession periods, which may be undesirable for a risk-averse investor. Also they show that the average return of various asset classes is dependent on the economic environment. Campbell and Viceira (2005) show that risk, defined as the conditional co-variances and variances per period of asset returns may be significantly different across investment horizons creating a term structure of risk-return trade-offs.

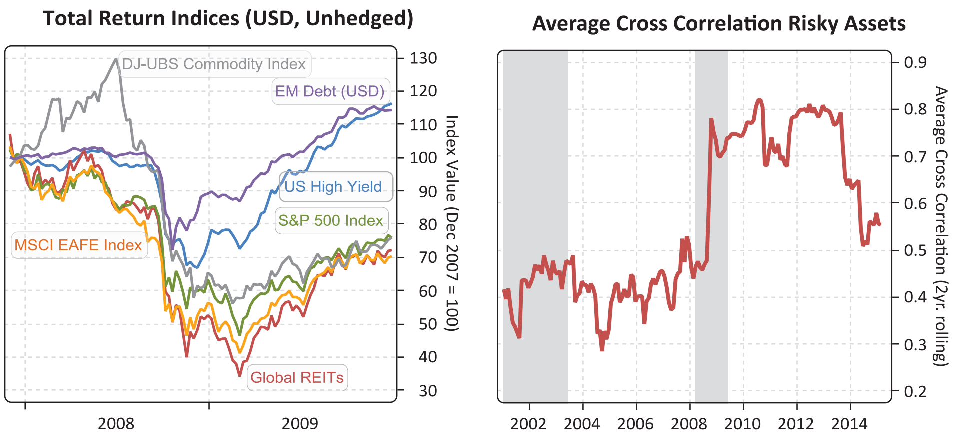

Fig.1 (a) Risky assets returns; (b) Average cross correlation
Source: Macrobond, Bloomberg, Bank of America Merrill Lynch;

Over the last decade, and especially following the financial crisis, institutional investors started to show increased interest in exploring and exposing the shortcomings of the mainstream approach to asset allocation. The lack of ‘responsiveness’ of the strategic asset allocation to the extreme market conditions of 2008 resulted in severe negative nominal returns for long term portfolios with large allocations to risky assets, and was even more concerning for pension funds who saw their funded ratio plummet in a ‘perfect storm’ scenario where low interest rates further exacerbated the impact of the drop in asset values on the funded status (see Fig.2,3 below).

The market recovery that followed further re-enforced the appeal of the idea of fair value and mean reversion in financial markets and increased the appetite of institutional investors to look for ways of making the asset allocation more responsive to changes in the macroeconomic and market environment over the medium term, hence in making the asset allocation more ‘dynamic’. Various forms of ‘dynamism’ have been observed across the portfolios of institutional investors ranging from alternative weighting schemes for benchmark indices and ‘smarter’ rebalancing strategies, to more fundamental approaches that seek to break the link between risk allocation and narrowly defined asset classes. Examples of the latter include risk-based, factor-based asset allocations and risk-parity type of strategies; however implementation challenges remain and results so far seem to be mixed.

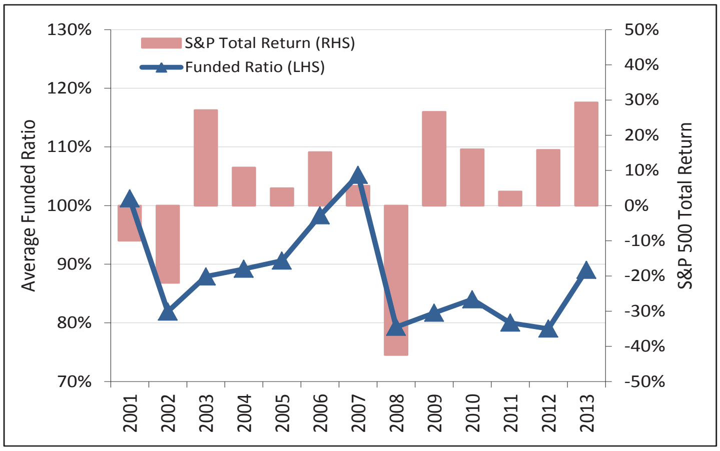

Fig.2 US Stock Market and Funded Ratios
Source: Funded Ratios based on Milliman Corporate Pension Fund Study 2014; Bloomberg, WB Treasury calculations

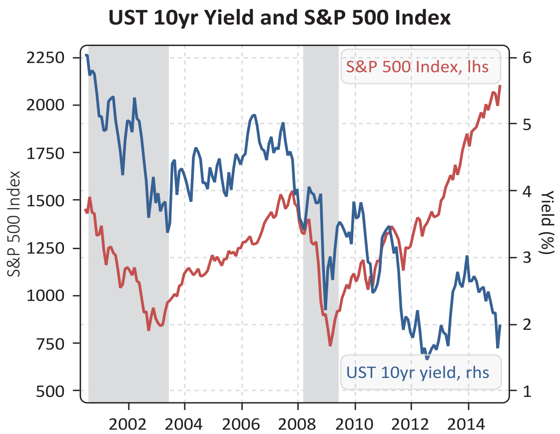

Fig.3 US Stock market and long term interest rates
Source: Macrobond, Bloomberg

The paper is organized as follows. The concept of DAA and its key characteristics are defined in Section 2. Technical aspects related to market signals and return predictability are reviewed in Section 3. Section 4 discusses the applicability of DAA in the context of pension funds with wealth dependent risk tolerance constraints. Section 5 illustrates key governance challenges and reviews alternative forms of implementation seen in practice, and Section 6 concludes.

2. DAA – Definitions and key characteristics

In the context of this paper we define 'Dynamic Asset Allocation' (DAA) as the process of implementing time varying expected excess returns (over risk free rate) and/or expected risk, with a medium term time horizon (e.g. 1-5 years), and with the objective to enhance the risk/return profile of the overall investment portfolio over such an investment horizon. This type of DAA is sometimes referred to in practice as ‘strategic tilting’ based on the work done by New Zealand Superannuation fund in this area since 2008[1]. In essence, it implies tilting the portfolio in favour of asset classes for which expected risk premium is higher than the long term equilibrium assumptions embedded in the strategic asset allocation and away from asset classes for which the expected risk premium going forward is significantly below the long term fair value assumption. It requires subscription to certain investment beliefs, most importantly, that expected excess returns and risk are time varying and mean reverting, and that changes in expected excess returns are at least somewhat predictable.

From an overall portfolio perspective, the consequence of implementing this type of DAA would be to reduce overall portfolio risk after a period when returns of risky assets have been abnormally high leading to market valuations significantly in excess of fair value estimates (e.g. stock market valuations in 1999 or 2007) and/or to increase the overall risk after a period when returns of risky assets have been abnormally low (e.g. 2008). One can easily see why, this type of active risk taking would be very appealing for long term institutional investors. If successful, it would smooth the downside risk profile of the fund in an extreme market environment like 2008, which was one of the main criticisms of the strategic asset allocation. However, both type of decisions involved in this form of DAA require the institutional investor to ‘lean against the wind’ and adopt a contrarian position that is outside of consensus as defined for example by the asset allocations of market peers. In addition, even if the model signal is correct, the time horizon over which reversion back to fair value will occur is uncertain and in the short run the position may continue to generate losses. In practice these represent significant concerns that need to be addressed upfront through the governance framework for DAA. Often times, in order to increase odds of positive returns and to minimize the time horizon of exposure investors will be tempted to wait for valuation signals to reach extreme levels before initiating a position. This approach comes with its own set of implementation challenges as trading may happen only very infrequently, many opportunities will be forgone and/or market circumstances will likely be very dire at that particular point in time, making it very hard to enter the position.

It is important to distinguish this form of DAA from other forms of tactical asset allocation and active risk taking. While the various forms of active risk taking share an embedded aspiration to generate excess returns while efficiently using the active risk budget, they differ in terms of benchmarks, scope, size, and investment horizon among other things. In the case of active management in the context of the implementation of an asset class mandate, the focus is very much on relative performance versus the asset class benchmark and the use of active risk is geared towards excess return on that basis (e.g. relative value, security selection, sector rotation). The asset manager is myopic to the overall performance of the fund, the active risk budget is fairly small and the time horizon is rather short. In the case of many institutional investors this type of active risk taking is delegated in part to external managers.

Tactical asset allocation can be thought of as active management with a broad universe of asset classes and a short to medium time horizon (typically up to 1 year). The objective in this case is to outperform a benchmark or zero in the case of a non-funded overlay. The types of signal and strategies used could be fundamental or quantitative, focused on valuation and non-valuation related factors (e.g. liquidity, momentum, etc.). The size of the risk budget is typically small relative to the overall risk budget and there are a large number of external managers that can be used to implement such strategies. From a governance perspective TAA could be managed quite similarly to traditional active management. By contrast, in the case of DAA, the focus is on the total risk/return profile of the fund, the investment horizon is significantly longer and size of the active risk budget is typically much larger. The type of signals that are the underlying drivers of DAA positions are valuation based, may have long periods of inactivity, may require a longer time horizon to reach fruition and may lead to underperformance in the short term. All these characteristics make it more likely for DAA to require a dedicated governance set-up distinct from the implementation of more traditional forms of active risk and more challenging to implement this form of DAA through external managers in a typical active risk mandate.

Table 1. Types of risk taking activities – key characteristics

Characteristics	SAA	DAA	Active Risk/TAA
Ownership	Board	Board/Staff	Staff
Decision maker	Board	Board/Staff	Portfolio manager
Impact on total return	Very large	Significant	Limited
Quick decision making	No	Yes	Yes
Time horizon	10+ years	1-5 years	0-1 years
View on returns	Yes	Yes	Yes
View on total risk	Yes	Yes	No
Type of returns	Total return	Total return	Relative return

[1] See for example New Zealand Superannuation (2011), “Strategic Tilting Policy” retrieved on October 20, 2014 at www.nzsuperfund.co.nz/sites/default/files/documents-sys/255535-v1-Strategic_Tilting_Policy.pdf

Implementation method	Physical Assets	Physical/Overlay	Physical/Overlay

As discussed, because of its potentially large impact on the risk/return profile of the plan over long term, the ownership for DAA has to reside at the highest level within the organization. At the same time, as it is important to retain the flexibility to act relatively quickly as market conditions change, the governance model has to allow for a large degree of delegation of investment decision making to investment staff within agreed parameters. One very good example in practice of how to strike the appropriate balance between these concerns is offered by the strategic tilting program of the New Zealand Superannuation fund, discussed in more detail in Section 5.

In practice there are also alternative governance models that could be used to implement to various degrees the full-blown DAA program described above. In most cases though, the alignment of ownership between staff and the board is a crucial component of the model, and the set-up is such that changes to the risk position of the fund due to DAA type of signals are incorporated in the investment strategy through more frequent revision of the SAA.

3. Predictability, signals and technical aspects

The form of DAA discussed in this paper relies on few key assumptions about financial markets, in particular that asset returns are not a random-walk, that there is mean reversion around a fair value level, and, that there are valuation related signals that have some predictive power with respect to expected asset returns going forward. In this section we discuss briefly the types of signals that could be used in this context, and illustrate technical issues around the implementation of a DAA program.

While there is a rich body of academic literature focusing on the issue of mean reversion there is no generally accepted consensus on this topic in finance. Fama and French (1988) find evidence of mean reversion in stock prices using long horizon regressions. DeBondt and Thaler (1985) find evidence of mean reversion in equity markets using 3 to 5 years holding periods while Poterba and Summers (1988) reach similar conclusions using the variance ratio test[2]. Evidence against mean reversion was found by Richardson (1993), Lo and MacKinlay (1988) and Kim, Nelson and Startz (1991) among others. Overall it is maybe to say that the predominant view seems to be that there is some evidence of mean reversion in equity market returns and in yield levels in fixed income markets but over long horizons and with a slow speed of mean reversion.

If one subscribes to the belief that there is mean-reversion, the next 'hurdle' to cross is the idea that there are observable valuation related variables that have an impact or some predictive power on expected excess asset returns over medium to long term investment horizons. Obvious candidates for equity markets are variables such as price/earnings ratios, dividend yield, and earnings yield, while for fixed income the current yield to maturity or the level of spread for credit instruments have been shown to have a positive correlation with the expected returns going forward. Vliet and Blitz (2009) show also that variables related to the business cycle such as ISM manufacturing index and unemployment may also have some predictive power in explaining expected asset class returns during the different phases of the business cycle.

For illustration purposes we follow Campbell (2008) and show various ways in which simple valuation ratios could be used to derive expectations with respect to equity risk premium going forward:

Dividend yield model:

$$\hat{R} = \frac{D}{P} + \left(1 - \frac{D}{E}\right) ROE \tag{1}$$

Earnings yield model:

$$\hat{R} = \frac{D}{E} \times \frac{E}{P} + \left(1 - \frac{D}{E}\right) ROE \tag{2}$$

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[2] Poterba and Summers used the variance test to detect whether transitory components account for a large proportion of the variance in monthly stock returns. They find evidence of positive serial correlation in stock returns over short horizons and of negative serial correlation over long horizons.

P/E reversion model:

$$\hat{R} = g\_real + \frac{\overline{D}}{P} + \Delta PE \tag{3}$$

where: $\hat{R}$ is the expected equity return over a 5 or 7 year investment horizon, $\frac{\overline{D}}{P}$ is the current dividend yield, $\frac{D}{E}$ is the payout ratio, $\frac{E}{P}$ is the earnings yield, g_real is the expected real gdp growth rate, ΔPE is the expected change in the PE ratio, and ROE is the accounting return on equity.

These simple models suggest that these types of signals may have some predictive power with respect to the forward looking realized return over a 5 year investment horizon for example. It also implies that risky assets can deviate from fair value over long time periods and that the point of entry can impact to some extent the realized return. It does not imply however that it may be any easier to forecast future returns than before, as the uncertainty around these forecasts is quite large and the horizon is long, but it implies that there is potential for value add by engaging in market timing over longer horizons based on the forecast of similar return predicting models. For example, in a DAA program expected excess returns derived based on these models could be compared with long-term equilibrium estimates and used to inform deviations from the strategic SAA weights. As such, when the expected excess return forecast for equities derived based on valuation models is significantly higher than the long-term equilibrium estimate embedded in the SAA, some of the DAA risk budget would be used to tilt the allocation in favor of equities, and vice versa.[3]

In the simplest fashion, the level of the valuation signals themselves could be used as triggers in a DAA set-up. Below we illustrate how a naive P/E signal or a credit spread signal would work.

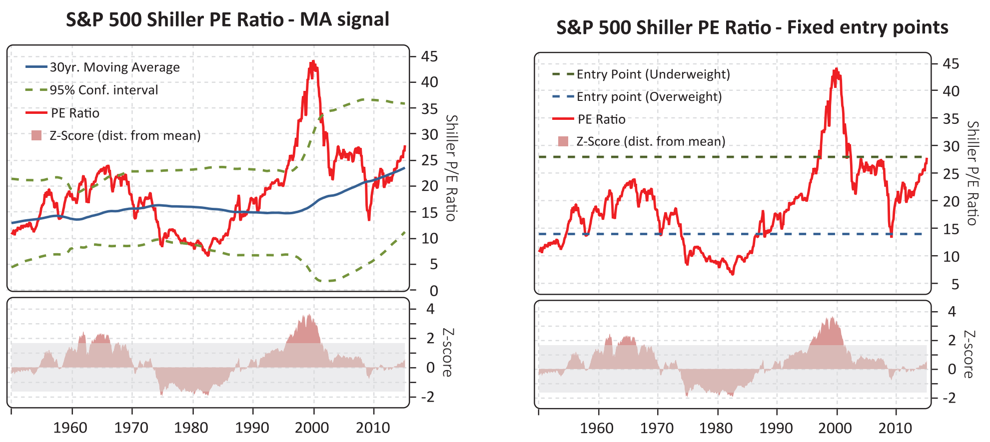

Fig. 4 P/E Valuation signal based on Shiller P/E Ratio; (a) Moving Average signal; (b) Fixed entry points

[3] There are additional questions that need to be answered through the set-up of the DAA framework, such as: how large the deviation in expectations needs to be to trigger action, what is the size of the position once a signal is triggered, how often is the position re-assessed, etc.

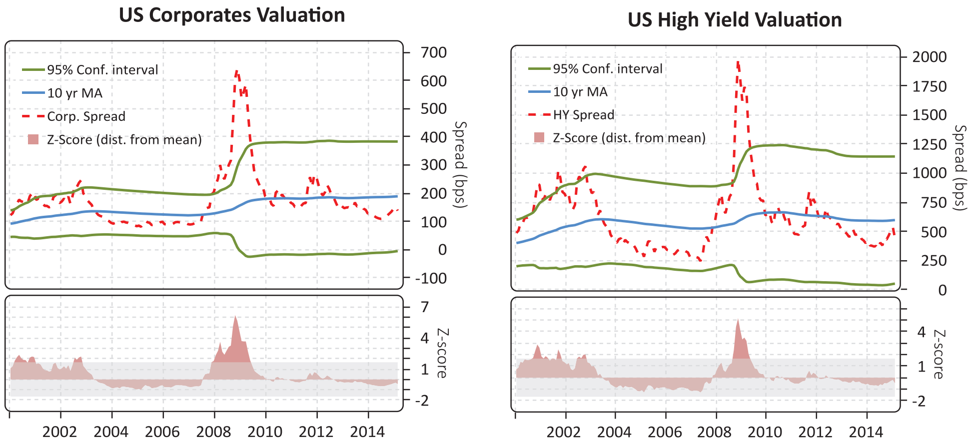

Fig. 5 Spread valuation signal – (a) US Corporate spread; (b) US High Yield spread

Fig. 4 and 5 above illustrate the evolution of the underlying valuation metric over time and highlight a 95% historical confidence interval around the 10-year or 30-year historical moving average. The 95% confidence band is estimated on a rolling basis over a time period consistent with the moving average. The underlying premise is that one would the current positioning of valuation metric in relation to the confidence band to determine when the market is at an extreme. Once a valuation signal is triggered the position is maintained until the signal reverts back to the mean. For ease of reference we assume an asset allocation with a 60%/40% stocks/bonds mix and a size of the DAA position of 10% over/underweight of the tilting asset[4]. Figures 5 and 6 below illustrate the excess return of the spread valuation signals since 2001.

The excess charts below illustrate some of technical challenges with the types of signals typically used in a DAA strategy such as: long periods of inactivity, potential for large underperformance in the short term, long exposure time once in a position, uncertainty about the true ‘fair value’, etc. In this context, the sizing of the position is relevant, and both entry and exit points are very important. In both cases the signal triggered a position in 2008, but market conditions were still deteriorating rapidly so the credit overweight underperformed the US Treasury Index during the crisis and only started to recover in 2009.

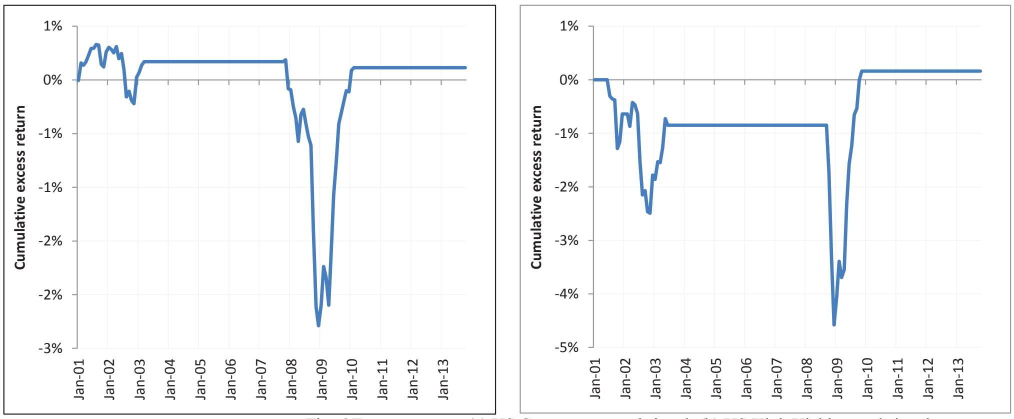

Fig. 6 Excess return – (a) US Corporate spread signal; (b) US High Yield spread signal

[4] In the case of the Corporate signal and High Yield signal the over/underweight is only to the spread component, not also the interest rate risk component. See appendix for further details.

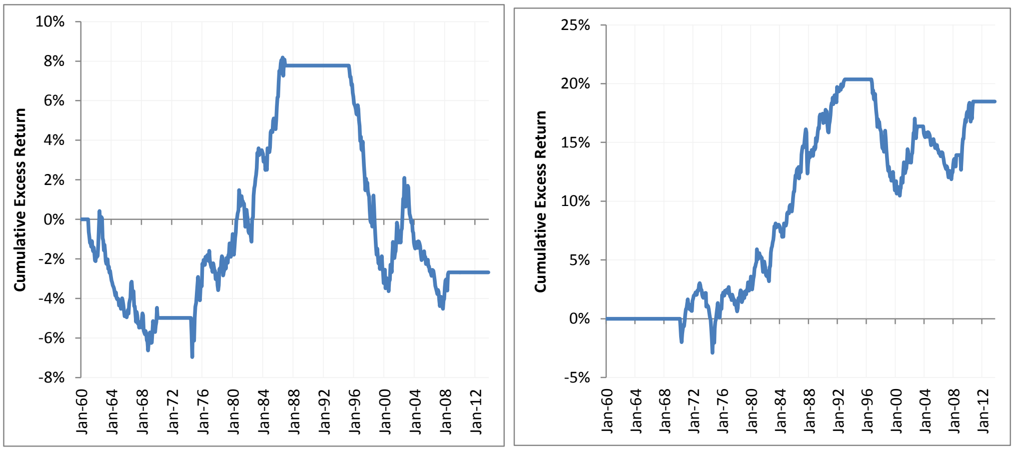

Fig. 7 Excess return – (a) P/E MA signal; (b) P/E fixed entry points signal

In the case of the P/E signal the overall excess return of the DAA strategy is negative when we follow the moving average and confidence band rule (see Figure 7.a). However, if we alter the entry and exit points and apply a fixed threshold rule where we overweight stocks whenever the P/E ratio is below 14, we underweight stocks whenever the P/E ratio is above 28 and we exit the positions whenever the P/E ratio reverts back to the 20 to 21 P/E range, then the excess return profile of the strategy becomes much more appealing (see Fig. 7.b).

Although very simple and highly susceptible of data mining, these examples bring to the forefront several issues believed to be very relevant as one thinks about the technical aspects related to this type of DAA:

- Data intensive – one needs to consider a range of signals/model to capture a fuller picture of valuations and market environment; a methodology for combining signals and other information and translating it in expected return forecasts needs to be developed;

- Quantitative process – there has to be a consistent framework that is applied over time where the focus is on the evolution of the underlying drivers of expected returns over the investment horizon, rather than on qualitative factors;

- Disciplined approach – a methodology for translating expected return forecast or signals into portfolio positions that is applied consistently over time is very important for the long term sustainability of the framework. Also, there has to be a feedback loop that allows for review and updating of models with some regularity;

- Position sizing and risk budgeting – appropriate sizing of positions, clear rules around the use of risk budgets and strong risk management and measurement practices are needed;

- Entry/exit points – it is important to capture aspects of market dynamics and understand appropriate entry/exit points, knowing that in the short run momentum may drive variables to overshoot and market may continue to move against the tilt;

- Qualitative overlay – these models are myopic to certain types of market information especially as it relates to liquidity conditions, risk environment and potential structural breaks. It is important to consider ways to incorporate that information flow in the decision making process.

4. Impact of risk tolerance and liabilities

So far we have focused on the applicability of a DAA strategy in the context of an asset-only portfolio with a long term investment horizon. In this section we discuss how this form of active risk taking can be applied in the context of investors with defined liabilities such as defined benefit pension plans.

As in the asset-only case, an obvious necessary condition for engaging in a DAA strategy is for the pension fund to have a long investment horizon, which may not be the case for many defined benefit plans today that are either closed or have a highly mature plan. The objective of defined benefit plans is to fund a future stream of benefit payments (liabilities) through a combination of sponsor and participant contributions, assets, and investment returns. Typically, participant contributions are fixed and benefit formulas are also pre-defined. The plan sponsor has to balance risk/return trade-offs and decide how much should the investment returns contribute towards funding the benefits versus sponsor contributions. The sponsor is responsible for making up the difference through increased contributions to the extent that asset returns fall short of expectations. Therefore, the focus in this case is to a large extent on the funding position of the plan, as expressed by the ratio of assets versus liabilities. Risk is defined as surplus volatility or the volatility in the funding ratio.

One way of thinking about DAA in the context of a defined benefit plan is to use the level of the funding ratio itself as the indicator of ‘over/under’ valuation. In other words, when the funding ratio is high plan sponsors would reduce exposure to risky assets and/or increase exposure to liability hedging assets (e.g. long duration nominal or real bonds, depending on the nature of liabilities). This approach reflects a change in risk preference rather than a change in expected excess returns but some similarities may be worth pointing out.

It is interesting to note that the motivation for the DAA position may or may not be aligned with the DAA motivation from an asset-only perspective, in the sense that, from a valuation perspective, the risky asset may or may not be significantly away from ‘fair value’. In an asset-liability framework it is possible that the ‘excess’ in funding ratio is driven by a large movement in risky assets, a change in the value of liabilities due to change in interest rates, or a combination of the two. However, one would expect this approach to be at least partially consistent with the valuation thesis embedded in an asset-only approach. Below we illustrate an example of such a DAA strategy and make some observations.

In this example we use the Ryan Labs Liability Index and a typical pension plan asset allocation with 60% exposure to equities and 40% exposure to a fixed income index like the Barclays Global Aggregate. For the DAA signal we use a corridor between 80 and 120 for the level of the funded ratio. If the funded ratio is above 120 the exposure to equities is reduced by 10% and exposure to fixed income asset is increased by the same amount, and vice versa if the funded ratio is below 80. The over/underweight is removed once the funded ratio reverts back to 100.

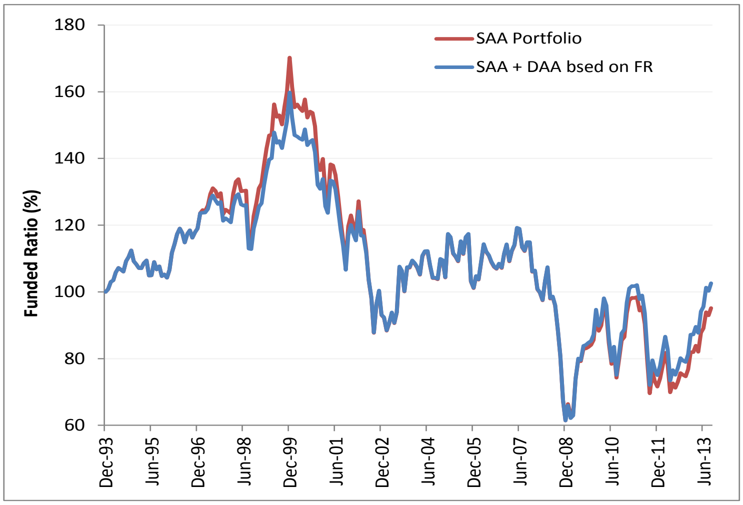

Fig. 8 – Example of DAA strategy based on funded ratio level

The addition of the DAA strategy in this case improves slightly the outcome over the historical period considered although it would have not changed the downside profile of the funded ratio during the financial crisis. It does however reduce the volatility of the funded ratio over the entire sample, and would have generated a faster recovery during the recent rally in risky assets. Few additional observations to consider:

- The link between the signal trigger and the action taken is not as strong as in the asset-only case, due to the impact of liabilities. Over the short term one runs the risk of both underlying drivers moving in the opposite direction (as has been the case over the last couple of years). Furthermore, there is not necessarily as strong of an evidence that the valuation of the assets are at extreme, as in the asset-only case;

- Although it may decrease overall volatility of the funded ratio over time, it increases the risk profile of the pension fund in the short term. This in and of itself would not be a problem if the investment horizon of the pension fund is long and its risk tolerance is adequately calibrated to fit the investment horizon.

But for most pension funds that assumption does not hold. This is either because prudential regulatory provisions prevent the fund from increasing the level of risk once the funded ratio falls below a certain threshold, or because the de-facto risk tolerance of the plan sponsor itself changes in response to lower funded ratios knowing that the institution would have to make increased contributions going forward to make up the gap. If the level of risk tolerance is wealth dependent than the pension fund would probably seek to do the opposite, that is be more inclined to increase risk when the funded ratio is high, and reduce risk when the funded status is below 100.

This approach appears to be consistent with changes in asset allocation of pension funds observed in practice over the last decade.

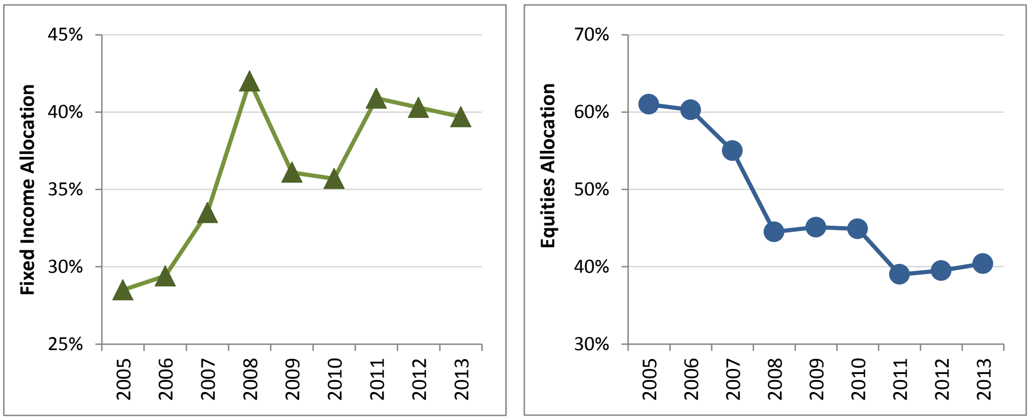

Fig. 9 Average allocation Top 100 Funds (Milliman Pension Study) – (a) Fixed Income; (b) Equities
Source: Milliman Pension Study, 2014

Figure 9 illustrate how the pension funds included in the Milliman Study have reduced significantly the equity allocation following the financial crisis and have yet to increase it to pre-crisis level. This is in part because of the maturity structure of their liabilities but also because the average level of funding has not yet recovered the pre-crisis peaks.

Overall, we believe that the issue of wealth dependent risk tolerance is more prevalent in the case of defined benefit pension plans compared to sovereign wealth funds. This issue, combined with the presence of explicit liabilities, makes this form of DAA (whether based on funded ratio or expected excess return signals) more challenging to implement in a pension fund context.

5. Governance and implementation challenges

Although the technical aspects related to DAA could be quite involving and may require undoubtedly dedicated resources and expertise, the governance aspects around DAA are far more challenging in our view and are worthwhile exploring in more detail in this section. Furthermore, we argue that governance arrangements determine the extent to which an institution can actually engage in different forms of dynamic risk taking and we provide a brief overview of some of the different forms of 'dynamism' seen in practice.

From an institutional point, one of the most important requirements prior to engaging in DAA is to have clarity around the investment objective or the investment mandate that is pursued and how does it fit within the overall investment framework of the organization. For example, if the objective of DAA is defined as achieving a higher expected return over time compared to the SAA then the focus from a governance perspective must be on creating the institutional ability and processes to sustain a higher level of risk taking at times. Alternatively, if the objective is defined as achieving a better downside risk profile or a better risk adjusted profile compared to the SAA, than appropriate governance frameworks that would allow a more active management of total risk should be developed.

Another important pre-requisite that has been already discussed briefly is the alignment with the investment beliefs of the institutional investor. This form of DAA presupposes subscription to the idea that financial markets have time varying and somewhat predictable properties that can be better managed through a dynamic approach. Unless this view is fully aligned with the investment philosophy of the organization and the investment model, it is very difficult to achieve the level of ownership that is required in order to implement successfully this form of active risk taking.

Even if one assumes that the hurdles above are cleared, DAA raises a myriad of governance issues for long term investors and even more so for public institutional investors like sovereign wealth funds and public pension funds. Some of these issues are illustrated below:

- Large impact decisions – if meaningful, DAA positions could have a large impact on the overall risk/return profile of the fund therefore the ownership of this activity needs to reside deep within the governance structure of the organization and not at the level of investment staff;

- Activity of long-term nature – the investment horizon is naturally long for most of the underlying signals used in this process. This raises challenges with respect to the ability of the institution to sustain these positions over the investment horizon and not blur the underlying motivation (e.g. risk of it being incorporated in the SAA as staff change, management changes, board members change, etc.);

- Long periods of inactivity – there might be long periods of time when valuation signals do not trigger active positions; it may become difficult to continue to stay disciplined, and maintain the focus of staff and the organization on the application of the models (e.g. stop model maintenance and update because it falls off the radar screen of staff due to lack of action);

- Difficulty to measure results – given the long-term nature and potentially infrequent position taking it is difficult to measure results, particularly over shorter investment horizons, which makes it hard to evaluate this activity (e.g. risk of drawing conclusions prematurely based on a small sample of investment decisions);

- Potential significant underperformance – this strategy implies a contrarian bias which may lead to significant underperformance in the short run, even if the positioning is correct in the longer term. Proper mechanisms have to be put in place beforehand from an institutional perspective to deal with these kind of circumstances, as they may provide a stern test at times for the risk tolerance of the institution;

- Timely decision making required – the governance framework has to be sufficiently flexible to allow proper delegation of investment decision making to the appropriate investment level such that portfolio actions can be initiated in timely manner in response to signal/model triggers;

- Alignment of interests/incentives – given the potentially large impact of DAA positions on the excess return versus the SAA it is important to achieve the proper balance of ownership and burden sharing between Board and investment staff in order to keep alignment of interest (particularly difficult in the absence of performance based compensation schemes);

- In-house technical expertise – from a technical perspective the development, validation and implementation of the signals/models used requires a certain level of investment expertise and also requires putting in place appropriate control and management systems;

- Reputational risk/communication challenges – disclosure to key stakeholders of significant losses in the short run due to DAA positions can lead to a loss of confidence and raise reputational risks for the institution, especially if strategy and investment rationale is not well understood and communicated upfront. The communication challenges that go along with this form of DAA should not be underestimated;

- Few real life institutional examples – not many organizations have implemented such DAA programs although aspects of this approach are incorporated in the investment frameworks of institutional investors in various ways.

One of the institutions that have been at the fore front of this type of active risk taking is New Zealand Superannuation fund. They have implemented a ‘strategic tilting’ program since 2009 and their experience provides a potential template for how to address many of the governance challenges discussed thus far. In the case of New Zealand Superannuation the DAA activity is governed by a separate active risk budget approved by the Board, distinct from the other active risk activities, with clear list of eligible assets and exposure limits. The objective of the activity is also clearly defined as ‘enhancing the Fund’s risk-adjusted returns over long horizons’.[5] The total size of the active risk budget for the ‘strategic tilting’ program has increased in June 2011 from 265 basis points to 690 basis points. The implementation is delegated to investment staff with the oversight of an Investment Committee and regular updates to the Board. The underlying models and investment framework for DAA is approved by the Board and reviewed with some periodicity. The models are based on ‘systematic forecasting approach’ focused on long-term expected cash flows and the default approach is to implement the signal of the model, with a judgmental overlay that seek to capture structural market breaks or periods of enhanced market stress.

One can think of alternative governance frameworks that aim to incorporate some components of the DAA activity in the investment activity of the fund. Table 2 below gives an overview of these frameworks and discusses key shortcomings in the context of the governance challenges raised above:

Table 2. Alternative governance approaches

Board Level Decision	DAA Ownership	DAA Implementation	Key Concerns
Sets asset allocation and overall active risk budget	Board/Staff	Staff	No separate active risk budget for DAA; objectives may not be clear; hard to evaluate DAA; decisions may get blurred with short-term TAA trades.
Annual review of SAA which incorporates valuation considerations	Board	Staff	Easier to implement but lacks flexibility to react to changes in valuations throughout the year; it may also imply a miss-calibration of the investment horizon. May also make the SAA too reactive to short-term events.
Formulate SAA in terms of conditional allocations based on market triggers	Board	Staff	Likely to be used more in the context of pension plans and focus more on the triggers related to the funding status rather than market levels. Different motivation and most likely focused more on reducing the downside.
Set total risk and return target and no asset allocation	Board/Staff	Staff/External managers	Hard to design mandates that achieve the proper alignment of interest with respect to DAA in this context. Staff and/or external managers will tend to focus on a shorter time horizon.

5.1. Forms of ‘dynamism’ seen in practice

Scanning the investment practices of institutional investors reveals quite a wide range of approaches geared towards making the asset allocation more dynamic and seeking to improve on the efficiency of the static SAA model. The majority of these either fall into the more traditional spectrum of tactical asset allocation and short term active risk taking or they seek to incorporate the dynamic approach into the SAA itself. In most cases they differ on one or multiple dimensions from the valuation driven form of DAA discussed thus far. Below we provide a quick overview of main approaches observed:

- Dynamic rebalancing – flexible rebalancing bands allowing for a larger deviation from the SAA. The width of the rebalancing bands could be used to exploit momentum (rebalance only when outside the band) or to allow for tactical deviations driven, among other things, by valuation signals. The investment horizon is inconsistent though with the DAA model;

[5] New Zealand Superannuation (2011), “Strategic Tilting Policy” retrieved on October 20, 2014 at www.nzsuperfund.co.nz/sites/default/files/documents-sys/255535-v1-Strategic_Tilting_Policy.pdf

- Better benchmark design, smart beta – increase diversification and risk efficiency by exploiting the known inefficiencies of market-capitalization weighting schemes. These could be implemented as active strategies or as part of the SAA through the policy benchmarks;

- Risk factor allocations/risk based allocations – develop the SAA based on targeting exposures to risk factors rather than asset classes. The underlying exposure to asset classes may change over time as the sensitivity of various asset classes to risk factors may change or as the efficiency of implementation of a particular risk factor through a combination of asset classes may change; the link to DAA is rather weak in this case, unless the allocation to risk factors themselves is changed dynamically over time incorporating a valuation bias;

- Downside protection – various forms of implementation as an active strategy. In some cases it is done through lower volatility equity mandates versus the SAA benchmarks, in other cases it is done through a dedicated dynamically managed tail-hedging strategy, etc. For long-term investors is raises issues with respect to the proper calibration of risk tolerance. A form of implementation that is better align with the DAA concept discussed is the idea of temporary reducing the SAA risk based on market valuation and/or systemic risk indicators. This approach has the advantage of achieving a better ownership of risk taking between staff and board, as it involves reducing the overall policy risk, and it is easier to implement in practice, but in essence it only deals with one part of the expected return distribution. Furthermore, if not managed properly, it raises significant concerns with respect to ability to re-risk the portfolio after the market stress event.

- Allocation changes based on internal risk triggers – more common in the case of pension funds that are looking to reduce risk versus liabilities (surplus risk) over time or manage it within certain limits. As discussed in previous section, it implies a risk tolerance which is dependent on the level of ‘wealth’ or funding position. One form of implementation is the idea of ‘glide path’ which suggests reducing the exposure to risky assets according to a pre-specified schedule as the funding position improves and increasing the exposure to liability hedging assets proportionally. Conceptually, there could be a link to the DAA concept, in the sense that improvement in the funding ratio could come about either because of the rise in rates, a rally in risky assets, or a combination of both, and therefore the ‘glide path’ would suggest tilting in favor of the asset that has gotten cheaper and/or away from the asset which has become more expensive. However, the objective and the underlying motivation of this strategy are different from what is envisaged through DAA. In this case the objective is simply to reduce the absolute level of risk taking versus liabilities as the fund approaches a fully funded status. Therefore, the ‘glide path’ becomes the SAA of the fund at any point in time.

6. Conclusion

We conclude that the rich field of Dynamic Asset Allocation could play a more significant role going forward in the investment management frameworks of institutional investors driven either by real return or funding ratio objectives. Valuation driven approaches that rely on the concepts of fair value and mean reversion seem to exhibit some return predictability properties linked to the business cycle which could be exploited to improve the expected risk/return profile of institutional investment portfolios over medium term horizons. In order to deliver on that promise, however, we argue that the governance processes and institutional arrangements around this activity represent very significant challenges which need to be addressed upfront. In particular, we highlight issues around setting investment objectives, appropriate decision making frameworks, and risk tolerance for the DAA activity as well as setting appropriate horizons and metrics for performance evaluation. In the case of defined benefit pension plans issues related to the interaction between the funding level and the overall risk appetite may pose additional challenges for DAA type of strategies and need to be explored further.

Appendix - Summary Statistics for mean reversion signals in Section 3

Additional specifications:

- For corporate spread and high yield spread signal data starts in 1996. Moving average and confidence bands estimated based on an expanding window until 2005, rolling window thereafter;
- The excess return for the corporate spread and high yield spread based on the duration adjusted excess return vs. US Treasuries for the US Corporate Master and US High Yield Master indices;

Table 3. Summary statistics – Backtest for mean reversion signals

Statistic	Corporate spread (confidence band signal)	High yield spread (confidence band signal)	P/E ratio (confidence band signal)	P/E ratio (fixed entry/exit points)
Backtest Period	2001 - 2013	2001 - 2013	1960 - 2013	1960 - 2013
Excess return (% annual)	0.03%	0.07%	-0.07%	0.5%
Tracking error (% annual)	0.8%	2.0%	1.5%	1.6%
Information Ratio (IR)	0.04	0.04	-0.05	0.31
No. of positions initiated	2	2	3	4
% of time with a position on	36%	25%	65%	66%
Average time in a position (months)	10	5	90	70
Longest time in a position (months)	29	24	158	274
Longest period of inactivity (months)	55	63	101	123
Longest period of negative excess return (cumulative, since the start of the position)	27	24	158	76
% of time with positive excess return while in a position	52.7%	50.0%	44.5%	52.1%
% of time with positive cummulative excess return while in a position	41.1%	10.0%	34.7%	64.0%
Average positive excess return (monthly)	0.15%	0.44%	0.36%	0.38%
Average negative excess return (monthly)	-0.16%	-0.42%	-0.30%	-0.33%
Largest negative excess return since the start of a position	-2.5%	-3.8%	-11.4%	-8.2%
Maximum drawdown since the start of a position	-2.5%	-3.8%	-11.4%	-8.2%

References

Brake, S., Drew A., Iverson D. (2009), "Governance, investment beliefs and dynamic asset allocation" – BIS/ECB/World Bank Public Investor Conference 2009.
Campbell, J.Y. and Thompson, S.B. (2008), "Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?". The Review of Financial Studies, 21, 1509-1531.
Campbell, J.Y. and Cochrane, J.H. (1999), "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior". The Journal of Political Economy, Volume 107, Issue 2, 205-251.
Campbell, J.Y. and Shiller, R.J. (1988), "Stock Prices, Earnings and Expected Dividends", Econometric Research Program Memorandum No. 334.
Campbell, J.Y., and Yogo M., (2006), "Efficient Tests of Stock Return Predictability." Journal of Financial Economics, 81 p.27-60
Campbell, J.Y. and Viceira, L.M. (2005), "The Term Structure of the Risk-Return Tradeoff". *Financial Analysts Journal*, Vol. 61, No. 1, January/February 2005
Campbell, J.Y. and Viceira, L.M. (2004), "Long-Horizon Mean-Variance Analysis: A User Guide." Manuscript, Harvard University, Cambridge, MA.
Cochrane, J.H. (1999), "New Facts in Finance", Federal Reserve Bank of Chicago, Economic Perspectives, Vol.23, No.3.
De Bondt, W.F.M. and Thaler, R. (1985), "Does the Stock Market Overreact?", Journal of Finance, Vol. 40, No. 3, 793-805.
Fama, E.F. and French K.R. (1988), "Dividend Yields and Expected Stock Returns". Journal of Financial Economics 22 p.3-25.
Kim, M.J., C.R. Nelson & R. Startz, (1991), 'Mean Reversion in Stock Prices? A Reappraisal of the Empirical Evidence', Review of Economic Studies 58, 515-528.
Lo, A.W. and MacKinlay, C.A. (1988) "Stock Market Prices do not Follow Random Walks: Evidence from a Simple Specification Test" The Review of Financial Studies, Vol. 1, No.1, 41-66
Poterba, J.M. & L.H. Summers, (1988), 'Mean Reversion in Stock Prices - Evidence and Implications', Journal of Financial Economics 22, 27-59.
Merton, R.C. (1971), "Optimum Consumption and Portfolio Rules in a Continuous-Time Model." Journal of Economic Theory 3, 373-413.
Milliman 2014 Pension Funding Study, available at: http://us.milliman.com/Solutions/Products/Corporate-Pension-Funding-Study/
Van Vliet, P. and Blitz D. (2009), "Dynamic Strategic Asset Allocation: Risk and Return across Economic Regimes" Available at SSRN: http://ssrn.com/abstract=1343063
Stambaugh, R.F. (1999), "Predictive Regressions." Journal of Financial Economics 54 p.375-421
New Zealand Superannuation Fund (2011), "Strategic Tilting Policy", retrieved on October 20, 2014 at www.nzsuperfund.co.nz/sites/default/files/documents-sys/255535-v1-Strategic_Tilting_Policy.pdf
Shiller, R.J. (1981), "Do prices move too much to be justified by subsequent changes in dividends?", American Economic Review, Vol. 71, No. 3, p. 421-436.